

USDA  
NATURAL RESOURCES  
CONSERVATION SERVICE  
MARYLAND CONSERVATION  
PRACTICE STANDARD  
**CONTOUR BUFFER STRIPS**  
CODE 332  
(Reported by Acre)

This standard does not apply to:

1. Situations where the width of the buffer strips equals or exceeds the width of the adjoining crop strips;
2. A buffer strip that will be established at the toe of the slope to reduce sediment leaving a crop field in surface runoff. A buffer strip in this location shall be planned and implemented according to the Maryland conservation practice standard for Filter Strip, Code 393.

**DEFINITION**

Narrow strips of permanent, herbaceous vegetative cover established across the slope and alternated down the slope with parallel, wider cropped strips.

**PURPOSES**

This practice may be applied for one or more of the following purposes:

1. To reduce sheet and rill erosion;
2. To reduce transport of sediment;
3. To enhance wildlife habitat.

**CONDITIONS WHERE PRACTICE  
APPLIES**

This practice applies to sloping cropland. It is most effective on uniform slopes ranging from 4 to 8 percent, where slope lengths are equal to or less than the Critical Slope Length (i.e., the length of slope above which contouring loses its effectiveness).

The practice may not be well suited to fields with undulating or rolling topography because of the difficulty of maintaining parallel crop strip boundaries or staying within row grade limits.

Permanent contour buffer strips are not considered part of the normal crop rotation.

**CONSIDERATIONS**

Consider the long-term land use objectives of the client and how the implementation and maintenance of this practice will affect those objectives.

Identify and evaluate any constraints such as management options, economic feasibility, access, state and federal regulations, or cost-share program requirements.

Consider the need to protect areas of existing or potential concentrated flow erosion by using other suitable conservation practices, such as grassed waterways, water and sediment control basins, diversions, or terraces.

Prior to layout, consider obstruction removal and changes in field boundaries to improve the effectiveness of the contour buffer practice and the ease of farming, especially to minimize short rows. If wildlife habitat would be negatively impacted by obstruction removal, consider re-establishment of wildlife food and cover plantings on nearby areas.

Prior to layout, determine locations where baselines should be established to assure that buffer strips and crop strips can pass by obstructions, ridge saddles, or other locations that may impact the effectiveness and practicality of the layout.

Within row grade limitations, whenever possible lay out buffer strips and/or crop strips parallel

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service.

with fence lines or other barriers. Account for access road widths when they must cross the field, and adjust the strip boundary on either side accordingly.

Consider soil types, drainage characteristics and crop tolerance to wetness. When inadequate drainage poses a potential problem, it may be desirable to lay out a system with row grades closer to the upper range permitted by this standard.

Consider adjusting buffer strip widths to reduce curves associated with irregular topography on crop strips. Consider the width of the land-owner/operator's farm machinery and implements when planning the width of the crop strips.

If wildlife habitat is a concern, consider using a diverse mix of native grasses and/or legumes in the planting, and increasing buffer strip widths to provide additional food and cover.

### **CRITERIA**

#### **Criteria Applicable to All Purposes**

**Erosion Control** - The level of erosion control to be achieved by the contour buffer strips shall meet or exceed the soil erosion level specified by the conservation planning objective. The Revised Universal Soil Loss Equation (RUSLE) shall be used to determine the effectiveness of this practice to reduce erosion to acceptable levels. Calculations shall account for the effects of all conservation practices, including management and supporting practices, in the conservation management system.

**Critical Slope Length** - The critical slope length is the length of slope above which contouring loses its effectiveness. The critical slope length for contouring shall be determined using RUSLE erosion prediction technology.

A contour buffer strip layout shall not be used on hillside slopes longer than 1.5 times the critical slope length for contouring, unless supported by other practices. Terraces or diversions may be used to reduce the slope length below the critical length. No-till and mulch till practices may be used to increase residue cover, thereby increasing the critical slope length.

**Vegetation** - Permanent vegetation grown on contour buffer strips shall consist of grasses or grass-legume mixtures adapted to the site and tolerant of expected farm machinery traffic.

Plants listed on the Maryland noxious weed list shall not be planted in a contour buffer strip system. Noxious weeds shall be controlled as required by state law.

The buffer strips shall have a vegetative Cover-Management Condition of 1 or 2 that provides protective cover and induces sediment deposition during periods when erosion is expected to occur on the cropped strips. (Refer to the Maryland Field Office Technical Guide, Section I-D, RUSLE P Factor Tables, for Cover-Management Conditions.) Cropped strips shall normally be expected to have a Cover-Management Condition that ranges from 3 to 7.

Note: In some situations, a field planned for a contour buffer strip system may already be established in an acceptable permanent cover. Under these conditions, lay out the system according to the criteria within this standard and establish the row crop strips. Then follow the operation and maintenance guidelines.

**Arrangement of Strips** - Cropped strips shall be alternated with buffer strips down the hill slope. Normally, a crop strip shall occupy the area at the top of the hill. The effectiveness of the buffer strips is determined by the location of the buffer strip(s) along the hillside slope and the relative percentage of the hillside slope occupied by row crops and buffer strips.

When used in combination with terraces, diversions, or water and sediment control basins, the layout of the buffer strips shall be coordinated with the grade and spacing of the structures so that strip boundaries are parallel to that of the structures where possible.

**Row Grade** - The grade along the top edge of the contour buffer strip shall be the same as for the row crop strip directly above it, and aligned as close to the contour as possible to achieve the greatest erosion reduction and sediment trapping.

When the row grade of any row crop strip reaches the maximum allowable design grade, a

new buffer strip shall be established and grade corrected for the layout of the next crop strip.

Minimum and maximum row grades are applicable as follows:

1. Minimum Row Grade - Fields with soils classified in Hydrologic Soil Groups C or D, or with crops sensitive to water ponded for periods of less than 48 hours, shall have a positive row grade of not less than 0.5 percent;
2. Maximum Row Grade - The maximum grade of rows within the row crop strips shall not exceed one-half of the up and downhill field slope or 2 percent, whichever is less. Up to 3 percent row grade is allowed for a maximum of 150 feet as crop rows approach a stable outlet.

Headlands or End Rows - Where row grades exceed the maximum row grade criteria for a row crop strip, headlands or end rows shall be established in permanent sod.

Width of Strips - The minimum width for contour buffer strips planted to grasses or grass-legume mixtures shall be no less than 15 feet. The minimum width for contour buffer strips planted to legumes shall be no less than 35 feet.

Generally, the contour buffer strips shall be of uniform width. Where a correction is needed due to non-uniform hillside slopes, the buffer strips may vary in width in order to maintain an even width for the adjacent row crop strip and/or to satisfy row grade criteria.

The row crop strips shall be of uniform width between buffer strips, and shall not exceed the lesser of:

1. 50 percent of the slope length (L) used for the erosion calculation; or,
2. 50 percent of the critical slope length for contour buffer strips. (The critical slope length for contour buffer strips shall be calculated by multiplying 1.5 times the critical slope length for contour farming.)

The cropped strip width shall be designed to account for some multiple of full equipment width.

Stable Outlets - Surface runoff from the contour buffer strip system shall be handled by grass waterways, field borders, filter strips, or other stabilized areas.

#### Additional Criteria to Reduce Transport of Sediment

Vegetation - Contour buffer strips that are intended to reduce the transport of sediment shall be established to permanent sod-forming vegetation.

Width of Strips - The minimum width for these buffer strips shall be 15 feet, except for the strip located at the toe of the slope as described below. The maximum width of row crop strips between contour buffer strips shall be one-half of the field slope length, not to exceed 150 feet.

A buffer strip shall be established at the toe of the slope to reduce sediment leaving the crop field in surface runoff. This buffer strip shall be planned and implemented according to the Maryland conservation practice standard for Filter Strip, Code 393.

#### Additional Criteria to Enhance Wildlife Habitat

Vegetation - When wildlife habitat will be provided in combination with one or more other purposes, then the minimum criteria for the other purposes (e.g., erosion control and sediment retention) must also be met. Plantings shall be selected to provide wildlife benefits, provided that they do not detract from a buffer strip's other functions.

Once established, contour buffer strips shall not be mowed during the nesting season of the desired wildlife species. For Maryland, the primary nesting season is generally from April 15 through August 15. Livestock and vehicular traffic shall likewise be excluded during the primary nesting season.

Width of Strips - If the contour buffer strip width required by the other purpose(s) is less than 35 feet, then additional width shall be added for

wildlife habitat, to achieve a minimum total width of 35 feet. When the primary purpose of the contour buffer strip is to trap sediment and other particulates in surface runoff, any addition to the buffer strip width specifically for wildlife habitat shall be added to the downhill edge of the strip where less sediment deposition is expected to occur.

The maximum width between contour buffer strips shall not exceed 300 feet.

*Note: Specific cost-sharing programs or other funding sources may dictate criteria in addition to, or more restrictive than, those specified in this standard.*

### **SPECIFICATIONS**

Specifications for installation and maintenance of contour buffer strips shall be prepared according to the Criteria, Considerations, and Operation and Maintenance described in this standard, and shall be recorded on specification sheets, job sheets, narrative statements in conservation plans, or other acceptable documentation.

All trees, stumps, rocks or similar materials that will interfere with installing the buffer strips shall be removed. The materials shall be disposed of in a manner consistent with maintaining a quality environment and with proper functioning of the buffer strips.

The installed practice shall be checked and documented to verify that it was completed according to the drawings, specifications, and this standard. Documentation shall be in accordance with the section "Supporting Data and Documentation" in this standard.

### **Selection of Plant Species**

For most sites and intended uses of the contour buffer strips, seeding mixes shall be specified in accordance with the Maryland conservation practice standard for Critical Area Planting, Code 342. Code 342 is best suited when severe site conditions are present or anticipated, and significant erosion control and sediment retention is needed.

When site conditions are not severe, and optimum wildlife habitat is desired, the Maryland

conservation practice standard for Conservation Cover, Code 327, shall be used to specify the appropriate seeding mix.

### **Proper Treatment of Plant Materials**

All plant materials must be correctly handled before planting. In general, plants shall be planted as soon as possible after receiving them from the supplier. Seed shall be kept cool and dry until planted.

### **Recommended Planting Dates**

Refer to the Maryland conservation practice standards for Critical Area Planting, Code 342, or Conservation Cover, Code 327, as appropriate, to determine the recommended planting dates for the different types of plant materials.

### **Establishment of Plant Materials**

Follow the establishment recommendations provided in the Maryland Job Sheets for warm season grass plantings and cool season grass plantings. The completed Job Sheet(s) can serve as the planting plan and specifications for the practice.

## **OPERATION AND MAINTENANCE**

An operation and maintenance (O&M) plan shall be prepared for the buffer strips. Appropriate Job Sheet(s) may be used to serve as the management plan as well as supporting documentation, and shall be provided to the land user. At a minimum, the following components shall be addressed in the O&M plan, as applicable:

### **Vegetation**

Vegetation must be maintained in a vigorous condition. For optimum sediment retention and other water quality benefits, mow two to three times annually to a height of 3 to 5 inches, and remove top growth if possible.

If wildlife habitat is a concern, allow some non-noxious weedy growth in the strips to increase plant diversity and provide good habitat for native pollinators. These insects and others also serve as important protein sources for adult birds and their young. Mow only the minimum area necessary to filter sediment, and do not mow

during the primary nesting season (April 15 to August 15).

Conduct all farming operations parallel to the strip boundaries except on headlands or end rows with gradients less than the criteria set forth in this standard. When tilling adjacent cropped strips, care must be taken to not encroach into the buffer strips and decrease the width, or to create furrows adjacent and parallel to the buffer strips that can turn into gullies.

Maintain fencing as needed to protect the buffer strips from uncontrolled access.

Control undesirable plants by pulling, mowing, or spraying with a selective herbicide. Control noxious weeds as required by Maryland state law.

Inspect for insects and diseases, and if an incidence threatens stand survival, take corrective action to bring the pest under control.

Spot seed or totally renovate buffer strip systems damaged by herbicide application after residual action of the herbicide is complete.

Renovate vegetated headlands or end row areas as needed to maintain ground cover above 65%.

### **Sheet Flow**

Maintain sheet flow entering the buffer strips. Repair all rills and small channels within the buffer strips. Needed repairs must be made immediately to reestablish sheet flow onto and through the buffer strips.

### **Sediment Accumulation**

Sediment that accumulates along the upper part and within the buffer strips shall be removed before it accumulates to a height of 6 inches and begins to divert runoff water around the buffer strips as concentrated flow. Removal and redistribution can be accomplished with tillage equipment or other machinery. The area disturbed by this removal shall be re-graded and replanted if necessary.

Sediment that accumulates along the up-slope boundary of the buffer strip shall be redistributed over the cultivated strip when needed to maintain

uniform sheet flow across the vegetated strip. If sediment accumulates just below the up-slope edge of the buffer strip to a depth of 6 inches, or vegetative ground cover falls below 65 percent in the buffer strip due to sediment, relocate the buffer/cropped strip interface location.

### **Acceptable Uses**

Describe the acceptable uses (e.g., flash grazing, haying, etc.) and time of year/frequency of use restrictions, if any. Pay particular attention to cost sharing program requirements as they relate to acceptable vs. restricted uses, and other management restrictions.

### **Frequency of Inspections**

Inspect the buffer strips at least once per year.

### **SUPPORTING DATA AND DOCUMENTATION**

1. Identify resource concern(s) to be treated (refer to the "Purposes" section of this standard);
2. Provide documentation for identified concerns (e.g., soil loss calculations, critical slope length, and/or wildlife habitat evaluation) as appropriate;
3. Identify the field location and extent of planting in acres, and complete the assistance notes. Also note the location of the planting on the conservation plan map. Assistance notes shall include dates of site inspections, name or initials of the person who made the inspections, specifics as to what was inspected, alternatives discussed, decisions made, and by whom;
4. Soil type;
5. Species selected for establishment, seeding/planting rates, and planting dates;
6. Design row grade, width and length of the contour buffer strips;
7. Design width of the row crop strips;
8. Operation and Maintenance plan or job sheet.

### **REFERENCES**

1. Annotated Code of Maryland, Title 9, Subtitle 4. *Weed Control*.
2. USDA, Agricultural Research Service, 1996. *Agricultural Handbook 703*. Washington, D.C.
3. USDA, Natural Resources Conservation Service. *Revised Universal Soil Loss Equation (RUSLE)*. Maryland Field Office Technical Guide, Section I-D.
4. USDA, Natural Resources Conservation Service. *National Handbook of Conservation Practices*.
5. USDA, Natural Resources Conservation Service. *Conservation Practice Standard for Conservation Cover, Code 327*. Maryland Field Office Technical Guide, Section IV.
6. USDA, Natural Resources Conservation Service. *Conservation Practice Standard for Critical Area Planting, Code 342*. Maryland Field Office Technical Guide, Section IV.
7. USDA, Natural Resources Conservation Service. *Conservation Practice Standard for Filter Strip, Code 393*. Maryland Field Office Technical Guide, Section IV.